

REMARKS

The Final Office Action mailed October 12, 2005, has been received and reviewed. Claims 1 through 16 and 19 are currently pending in the application. Claims 1 through 16 and 19 stand rejected. Applicants propose to amend claims 1 and 2, and respectfully request reconsideration of the application as proposed to be amended herein.

35 U.S.C. § 112 Claim Rejections

Claims 1 through 16 and 19 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. Applicants respectfully traverse this rejection, as hereinafter set forth.

The Examiner asserts at page 2 in the outstanding Office Action the limitation of the carrier bond being configured “to extend beyond an outer surface of the encapsulant material” (as recited in the claims 1 and 2 previously presented in the communication filed on July 19, 2005) is vague. Applicants assert that the carrier bonds in the intermediate structure as recited in claims 1 and 2 do not extend beyond any encapsulant material, but are rather “configured to extend beyond an outer surface of the encapsulating material **to be subsequently applied to the intermediate structure,**” as recited in each of claims 1 and 2 as currently amended.

In light of the above, Applicants assert that claims 1 and 2 are not vague and indefinite, but clearly point out and distinctly claim the subject matter which the Applicants regard as their invention. Therefore, Applicants respectfully request that the Examiner withdraw the rejection of claims 1-16 and 19 under 35 U.S.C. § 112, second paragraph.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on U.S. Patent No. 5,677,566 to King et al. in view of U.S. Patent Publication No. 2001/0011773 A1 to Havens et al.

Claims 1, 2, 5 through 9, 13 through 16 and 19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over King et al. (U.S. Patent No. 5,677,566) in view of Havens et al. (U.S.

Patent Publication No. 2001/0011773 A1). Applicants respectfully traverse this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

Applicants respectfully assert that independent claim 1 could not have been obvious to one of ordinary skill in the art at the time the invention was made because the teachings of King et al., considered together with the teachings of Havens et al., do not teach or suggest all the limitations of claim 1. In particular, the cited prior art references when combined do not teach or suggest “[a]n intermediate structure...comprising: ...**at least one carrier bond ... directly disposed on [an] upper surface of each conductive lead frame member** of [a] plurality of conductive lead frame members...; and wherein the intermediate structure is **free of encapsulating material...**,” as recited in independent claim 1 as currently amended.

King et al. do not describe, teach, or suggest an intermediate structure that is free of encapsulant material and that includes a carrier bond directly attached to a conductive lead frame member. In contrast, King et al. teach encapsulation of an intermediate assembly **prior to** providing any carrier bonds on conductive lead frame members, as illustrated in FIG. 7 therein. As described by King et al., “[t]he encapsulating material 26 is formed with openings 30 to expose conductive leads 12 at electrode bond area 34. Openings 30 are sized and shaped according to the size and shape of solder balls 38, which form the external electrodes.... Referring to FIG. 8, solder balls 38 are bonded to electrode bond area 34 of conductive leads 12, which are exposed through openings 30.” King et al., column 4, lines 36-41; column 4, lines 49-51.

Havens et al. do not describe, teach, or suggest an intermediate structure that is free of encapsulant material and that includes a **carrier bond directly attached to a conductive lead frame member**. In contrast, Havens et al. teaches (with reference to FIG. 1) an intermediate structure that is free of encapsulant material and includes “a circuit substrate 3 (e.g., a dielectric structure having one/more internal and/or external conductive planes “P” and one more dielectric layers “D”), semiconductor chip 4, a plurality of conductors 5 electrically coupling semiconductor chip 4 to substrate 3, and a plurality of conductors 6 for electrically coupling substrate 3 to an external substrate (e.g., a printed circuit board).” Havens et al., page 2, paragraph [0028]. “In one embodiment, conductors 5 and 6 are preferably solder balls which in turn may be of solder compositions ... known in the electronic packaging art.” Id.

Applicants respectfully assert that, at best, King et al. and Havens et al., when combined, teach or suggest an intermediate structure as shown in Figure 7 of King et al., wherein the encapsulating material 26 has been applied using the methods described in Havens et al. at page 5, paragraphs [0057-0058] with reference to Figures 8 and 9.

As King et al. and Havens et al., when combined, do not teach or suggest “[a]n intermediate structure...comprising: ...**at least one carrier bond ... directly disposed on [an] upper surface of each conductive lead frame member** of [a] plurality of conductive lead frame members...; and wherein the intermediate structure is **free of encapsulating material...**,” as recited in independent claim 1 as currently amended, Applicants respectfully assert that independent claim 1 could not have been obvious to a person of ordinary skill in the art at the time the invention was made considering King et al. in view of Havens et al., and request that the Examiner withdraw the rejection of independent claim 1 under 35 U.S.C. § 103(a).

Applicants additionally assert that independent claim 1 could not have been obvious to one of ordinary skill in the art at the time the invention was made because there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine the reference teachings. The Examiner asserts at pages 4-5 of the outstanding Office Action that “it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the intermediate package structure of King by forming the intermediate structure free of encapsulant as taught by

Havens to reduce the amount of moisture in the package during the subsequent encapsulation process and ultimately improving the device yield.” Applicants respectfully disagree. Havens et al. does not teach or suggest that forming carrier bonds prior to encapsulating an intermediate structure results in a reduced amount of moisture in the final package relative to final packages formed by encapsulating an intermediate structure and subsequently forming carrier bonds, as asserted by the Examiner.

Havens et al. describes a method of providing a protective covering on an electronic package including a dielectric circuit substrate, and a chip electrically coupled to the substrate by wire bonds or solder balls. Havens et al. teaches that, if the substrate includes solder balls or conductors 6 for electrically coupling the substrate to an external substrate such as a printed circuit board, at least a portion of the surfaces of the conductors 6 may be covered or protected while a coating of Teflon is applied to other exposed surfaces of the package (Havens et al., page 3, paragraphs [0029] – [0030], [0041]; page 4, paragraph [0045]), or all surfaces of the conductors 6 may be coated and a portion of the coating subsequently removed (Havens et al., page 4, paragraphs [0052] – [0055]). Havens et al. further teaches that, if the substrate does not include solder balls or conductors 6 for electrically coupling the substrate to an external substrate such as a printed circuit board, all surfaces of the package may be coated and regions of the coating selectively removed to allow subsequent formation of the conductors 6, in a method similar to that taught by King et al. in relation to Figures 6-7. Havens et al., page 5, paragraphs [0057] – [0058].

Havens et al. does not teach or suggest that it is preferred to apply the conductors 6 prior to the protective coating, or that there is any benefit to applying the conductors 6 prior to the protective coating. Therefore, because the intermediate structure taught by King et al. does not include external electrodes 28 (as shown in Figures 6-7), one of ordinary skill in the art at the time of the invention would only be motivated to provide the protective coating taught by Havens et al. prior to forming the external electrodes 28 using the method described by Havens et al. at page 5, paragraphs [0057] – [0058] in relation to Figures 6-7. One of ordinary skill in the art would not be motivated to modify the teachings of King et al. to provide the external electrodes 28 prior to applying a protective coating as described by Havens et al. or the encapsulating

material 26 described by King et al., because neither the King et al. reference nor the Havens et al. reference expressly or inherently suggest the desirability of making such a modification, as asserted by the Examiner.

In view of the above, Applicants respectfully assert that there is no suggestion or motivation, either in the cited references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the teachings of King et al., or to combine the teachings of Havens et al. with those of King et al., in such a way as to provide the invention recited in claim 1. For this additional reason, Applicants respectfully assert that independent claim 1 could not have been obvious to a person of ordinary skill in the art at the time the invention was made considering King et al. in view of Havens et al., and request that the Examiner withdraw the rejection of independent claim 1 under 35 U.S.C. § 103(a).

Regarding independent claim 2, Applicants respectfully assert that independent claim 2 could not have been obvious to one of ordinary skill in the art at the time the invention was made because the teachings of King et al., considered together with the teachings of Havens et al., do not teach or suggest all the limitations of claim 2. Independent claim 2 includes elements and limitations substantially similar to those of claim 1 previously discussed herein. Applicants therefore respectfully request reconsideration and allowance of claim 2 as currently amended for the same reasons set forth above with respect to independent claim 1.

Furthermore, the nonobviousness of independent claim 2 precludes a rejection of claims 5 through 9, 13 through 16, and 19, which depend therefrom, because a dependent claim is obvious only if the independent claim from which it depends is obvious. *See In re Fine*, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988), *see also* MPEP § 2143.03. Therefore, the Applicants request that the Examiner withdraw the 35 U.S.C. § 103(a) obviousness rejection to independent claim 2 and claims 5 through 9, 13 through 16, and 19, which depend therefrom.

Regarding dependent claim 14, Applicants respectfully assert that the teachings of King et al., considered together with the teachings of Havens et al., do not teach or suggest carrier bonds that comprise a conductive or conductor-filled polymer, as recited therein. Therefore, Applicants respectfully assert that dependent claim 14 could not have been obvious to a person of ordinary skill in the art at the time the invention was made considering King et al. in view of

Havens et al., and request that the Examiner withdraw the rejection of dependent claim 14 under 35 U.S.C. § 103(a) for this additional reason.

Obviousness Rejection Based on U.S. Patent No. 5,677,566 to King et al. in view of U.S. Patent Publication No. 2001/0011773 A1 to Havens et al., and further in view of U.S. Patent No. 5,894,107 to Lee et al.

Claims 3 through 4 and 10 through 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over King et al. (U.S. Patent No. 5,677,566) in view of Havens et al. (U.S. Patent Publication No. 2001/0011773 A1) as applied to Claims 2 and 9, and in further view of Lee et al. (U.S. Patent No. 5,894,107). Applicants respectfully traverse this rejection, as hereinafter set forth.

Each of claims 3 through 4 and 10 through 12 depends either directly or indirectly from independent claim 2, and as a result, each includes the limitations recited in independent claim 2.

Applicants assert that none of claims 3, 4 and 10 through 12 could have been obvious under 35 U.S.C. § 103(a) at the time the inventions were made because the cited references do not teach or suggest teach or suggest all the claim limitations found in independent claim 2, as currently amended, from which each of claims 3 through 4 and 10 through 12 depends.

As previously discussed, King et al. and Havens et al., when combined, do not teach or suggest an intermediate structure comprising **at least one carrier bond directly disposed on an upper surface of each conductive lead frame member** of a plurality of conductive lead frame members; and wherein the intermediate structure is **free of encapsulating material**, as recited in independent claim 2 as currently amended. Furthermore, Lee et al. do not describe, teach, or suggest an intermediate structure in the fabrication of a chip-scale package that is free of encapsulant material and that includes a carrier bond directly attached to a conductive lead frame member. In contrast, Lee et al. teach encapsulating a chip and lead frame assembly and **subsequently** providing a plurality of carrier bonds in the form of solder balls 16 on exposed upper surfaces of external connection means 34. Lee et al., column 5, lines 20-29, and 39-43; FIGS. 11-12.

As King et al., Havens et al., and Lee et al., when combined, do not teach or suggest “[a]n

intermediate structure...comprising: ...**at least one carrier bond ... directly disposed on [an] upper surface of each conductive lead frame member** of [a] plurality of conductive lead frame members...; and wherein the intermediate structure is **free of encapsulating material...**,” as recited in independent claim 2 as currently amended, Applicants respectfully assert that none of claims 3 through 4 and 10 through 12 could have been obvious to a person of ordinary skill in the art at the time the invention was made considering King et al. in view of Havens et al., and further in view of Lee et al., and request that the Examiner withdraw the rejection of dependent claims 3 through 4 and 10 through 12 under 35 U.S.C. § 103(a).

Furthermore, for the same reasons previously discussed herein, Applicants respectfully assert that there is no suggestion or motivation, either in the cited references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the teachings of King et al., or to combine the teachings of Havens et al. with those of King et al., in such a way as to provide the invention recited in any one of claims 2 through 4 and 10 through 12. For this additional reason, Applicants respectfully assert that none of claims 2 through 4 and 10 through 12 could have been obvious to a person of ordinary skill in the art at the time the invention was made considering King et al. in view of Havens et al., and further in view of Lee et al., and request that the Examiner withdraw the rejections of dependent claims 3 through 4 and 10 through 12 under 35 U.S.C. § 103(a) for this additional reason.

ENTRY OF AMENDMENTS

The proposed amendments to claims 1 and 2 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application. Further, the amendments do not raise new issues or require a further search. Finally, if the Examiner determines that the amendments do not place the application in condition for allowance, entry is respectfully requested upon filing of a Notice of Appeal herein.

CONCLUSION

Claims 1 through 16 and 19 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, the Examiner is respectfully invited to contact Applicants' undersigned attorney.

Respectfully submitted,



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Date: December 8, 2005

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